12 E

Form C-104
Rev. 02/2009

VALUE ENGINEERING CHANGE PROPOSAL
MISSOURI DEPARTMENT OF TRANSPORTATION

☒ Conceptual Proposal ☒ Final Proposal Date Feb. 10, 2011

Contract ID J6I0984 091208-601 Job No. J6I0984

County St. Louis 6BR Original Bid Cost 229,450,505.00

Contractor MTA By

Designed By R. Russell / M. Hayes; PCE & BRK Phone 314-996-0421

VECP# 11-08 (to be completed by C.O.) VECP ☐ or PDVECP ☐

1. **Description of existing requirements and proposed change(s). Advantages/Disadvantages**
   We propose the following:
   A. For the service feeders and raceway, substitute Aluminum ladder type cable tray system and either individual dual insulated cables or multi conductor interlocked armored cable in Aluminum or copper (see pricing breakdown next sheet). Also shown on the pricing sheet is 3 conductor options and 4 conductor options. This has to do with eliminating the neutral conductor, which we do not see as needed since the tower illumination (277- volt) has been eliminated.
   B. Delete (2) 112.5kVA transformers from scope (for the LED lighting system).

2. **Estimate of reduction in construction costs.** $370K to $802K -see attachment for pricing options

3. **Prediction of any effects the proposed change(s) will have on other department costs, such as maintenance and operations.**
   A. Cable tray systems would allow for easy installation of future feeders and/or communication cables.
   B. The proposed design would NOT utilize sealtite and sealtite connectors at the expansion joints. Sealtite may crack, peel, and eventually break at the sealtite connectors over time, and would be very difficult to replace.
   C. Less splices in the feeders

4. **Anticipated date for submittal of detailed change(s) of items required by Section 104.6 of the Specifications.**
   Within 2 weeks after return of this submittal, if accepted
   (date)

5. **Deadline for issuing a change order to obtain maximum cost reduction, noting the effect of contract completion time or delivery schedule.**

   03/11/2011 (date) would assist with installation schedule. (effect)

6. **Dates of any previous or concurrent submission of the same proposal.**
   11/09/10 similar proposal
   (date and/or dates)

Additional Comments:
See attachment for details regarding advantages and pricing options. Cable tray and cable literature attachments to this proposal are to establish the nature and quality of products proposed. Alternate manufacturers of similar quality may be proposed in the final VE submittal. By using cable tray that is the same as used on the Bay Bridge in San Francisco there would be less splices in the cable. The options for future uses would be vastly increased. The design would be better suited for expansion and deflection that MAY OCCUR.

**** Portion Below This Line To Be Filled Out by MoDOT ****

Comments:
This concept proposal provides for a substitution of an Aluminum ladder type cable tray system in lieu of PVC Coated Aluminum Conduit and a substitution of either individual dual insulated cables or multiconductor interlocked armored cable in Aluminum or Copper in lieu of the MoDOT standard single conductor wires. Based on discussions with MoDOT's Design Consultant, District MoDOT Lighting and AmerenUE (see attached Email), approval is recommended for this concept proposal. Final design and cost SAVINGS ARE CURRENTLY UNDER REVIEW.

Submitted By Resident Engineer — Date: 2/15/11

Comments:
We believe this proposal will give us a superior product in addition to cost savings. This system could also have applications on future designs.

☑ **Approval Recommended**
☐ **Rejection Recommended**

for District Engineer — Date: 2/15/11

Comments: LOOKS OK IN CONCEPT, SUBJECT TO APPROVAL OF FINAL PROPOSED DETAILS AND SPECIFICATIONS.

☑ **Approval Recommended**
☐ **Rejection Recommended**

Federal Highway Administration — Date: 2/16/2011
Required for FHWA Full Oversight Projects

Comments: Ok for conceptual approval, final plan details to be worked out prior to change order completion.

☒ **Approval**
☐ **Rejection**

Digitally signed by Travis Koestner
DN: cn=Travis Koestner, o=Missouri Department of Transportation, ou=Assistant State Construction and Materials Engineer, email=travis.koestner@modot.mo.gov, c=US
Date: 2011.03.08 14:15:01 -06'00'

State Construction and Materials Engineer — Date: March 8, 2011

Distribution: **Resident Engineer, Project Manager, District Construction & Materials Engineer, State Construction & Materials Engineer, FHWA Value Engineering Administrator – MoDOT, P. O. Box 270, Jefferson City, MO 65102**

ATTACHMENT TO

VALUE ENGINEERING CHANGE PROPOSAL
MISSOURI DEPARTMENT OF TRANSPORTATION
NEW MISSISSIPPI RIVER BRIDGE PROJECT No. J6I0984

February 10, 2011

Proposed VE for the main electrical feeders:

A. For the (3) service feeders (MoDOT #1, MoDOT #2, and Aesthetic Lighting Service), substitute an Aluminum ladder type cable tray system and tray cables, in lieu of PVC Coated Aluminum conduit and single conductor wires. Advantages are:
   a. Safer - Ladder tray will provide a means for less exposure to working at heights over the river.
   b. Ladder tray provides for easy installation of future additional feeders or replacement of existing feeders.
   c. Ladder tray provides for easy installation of future communications and/or fiber optic cables.
   d. Eliminates bulky pull boxes, sealtite, and sealtite connectors. The sealtite between pull boxes at expansion joints makes it difficult for wire pulling, and may crack and break over extended periods of time.
   e. Provides better installation for expansion and contraction of the bridge.
   f. Provides a better fit for any deflection in the bridge structure.
   g. Fewer splices needed in feeders.
   h. Aids with any schedule concerns. Raceway can be installed on bridge sections while the sections are being fabricated on the barge. No need to wait until bridge is constructed.

B. There are several options for tray cable types, including Aluminum conductors.
   a. Armored cable, copper conductors (included in VE base savings amount):
      i. Advantage -- added mechanical protection
      ii. Disadvantage – relatively more cost and labor than non-armor and aluminum.
      iii. **Will require the most splices other than conduit and wire method.**
   b. Non-armored cable, copper conductors
      i. Advantage – less expensive and labor intensive than armor.
      ii. Disadvantage -- **Will require the second most splices other than conduit and wire method.**
   c. Armored cable, aluminum conductors – same as armor clad copper, but about 50% less weight = safer and less labor. In many instances, the weight is the limiting factor in pull lengths. Less weight allows for longer reel lengths and installed lengths without splices. The aluminum alloy AA-800 series has been developed to meet the electrical industry standards for elongation, thermal stability, compressive creep, and flexibility to closely resemble the characteristics of copper. In 1987, NEC began requiring this alloy for any electrical applications. Aluminum has been used since 1987 without the reported problems relative to the experiences of the previous generation of aluminum. At least one of the manufacturers **offers a 5 year warranty. Copper warranty is only 1 year.**

d. Non-armored cable, aluminum conductors – combined advantages/disadvantages of non-armor copper and aluminum feeders, as indicated above. **This option provides the most inexpensive installation and also the least amount of splices.**

C. We propose deleting (2) 112.5kVA transformers for the LED lighting system from scope as they are no longer required.

D. We propose elimination of the neutral conductor in the 480V 3-phase main feeders. The neutral is only used by the lighting contactor, which could be fed from a small 250VA transformer. The neutral needs to be carried to the service disconnect, which in this case would be in the meter enclosure. We do not believe it needs to be carried all the way to the electrical rooms, by code.

COST SAVINGS PROJECTIONS*:

- CABLE TRAY AND TRAY CABLE

		Credit Amount	rank in least amount of splices	
COPPER				
alternate 4C interlocked armored CU		$ 370,000.00	8	most splices
base credit given 4c/ single Cu		$ 501,000.00	4	
alternate 3C interlocked armored CU		$ 521,000.00	6	
base credit given 3c/ single Cu		$ 602,000.00	3	
ALUMINUM				
alternate 4C/interlocked armored Aluminum		$ 641,000.00	7	
alternate 3C/interlocked armored Aluminum		$ 701,000.00	5	
alternate 4C/single Aluminum		$ 751,000.00	2	
alternate 3C/single Aluminum		$ 801,000.00	1	least splices

- ELIMINATE (2) 112.5kVA TRANSFORMERS FROM SCOPE **$ 13,000 ESTIMATED SAVINGS**

Examples of Tray Use on California Transportation Department Projects:

Attachment "A": contractors' questions and answers to a bid request
Attachment "B": activity report for Bay Bridge (Oakland-San Francisco activity report listing cable tray being installed

*Note: Based current copper pricing. Savings subject to change due to copper pricing volatility.
**Note: Pricing may be provided for this option based on conduit and wire scenario or use of Aluminum conductors upon request.

5" NEMA VE 1 Loading Depth
6" Side Rail Height

Straight Section Part Numbering

Prefix

Example: 26 A 09 - 24 - 144

Series
- 26
- 36
- 46
- H46†

Material
- A = Aluminum

***Type**

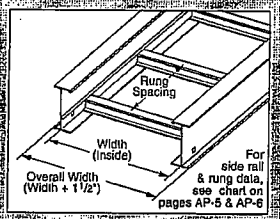
Ladder-
- 06 = 6" rung spacing
- 09 = 9" rung spacing
- 12 = 12" rung spacing

Trough-
6" thru 36" wide
- VT = Vented Trough
- ST = Non-Ventilated Trough

***Width**
- 06 = 6"
- 09 = 9"
- 12 = 12"
- 18 = 18"
- 24 = 24"
- 30 = 30"
- 36 = 36"

Length

① 144 = 12 ft.	26
② 240 = 20 ft.	
① 240 = 20 ft.	36
② 144 = 12 ft.	
① 240 = 20 ft.	46
② 288 = 24 ft.	
① 240 = 20 ft.	H46
② 300 = 25 ft.	

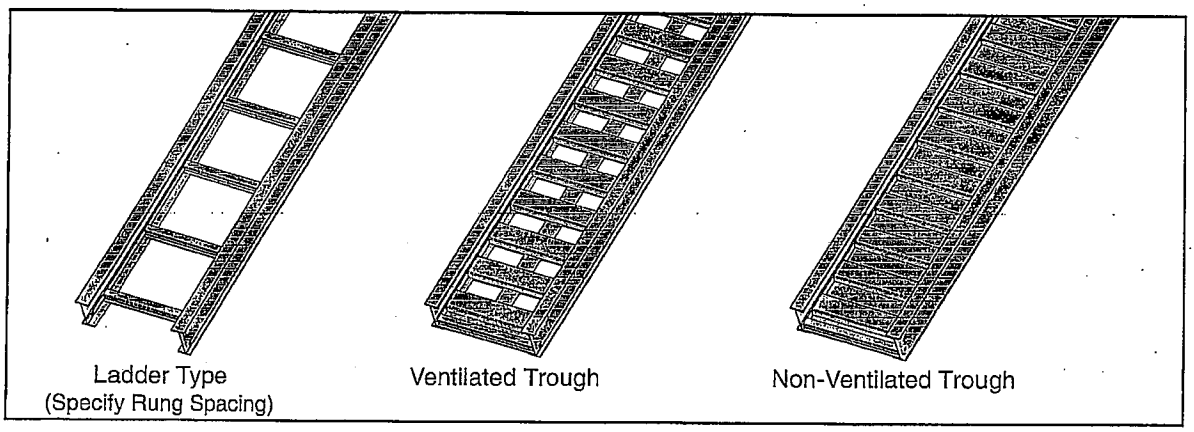


† H46A only available in ladder type 9" and 12" rung spacing. See page 363.

①Primary Length.
②Secondary Length.

See page 39 for explanation of lengths.

See page 362 for additional rung options. *Special sizes available.



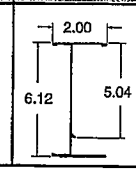
Ladder Type (Specify Rung Spacing) | Ventilated Trough | Non-Ventilated Trough

● Green = Fastest shipped items ● Black = Normal lead-time items ● Red = Normally long lead-time items

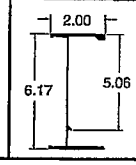
5" NEMA VE 1 Loading Depth
6" Side Rail Height

Values are based on simple beam tests per NEMA VE 1 on 36" wide cable tray with rungs spaced on 12" centers. Cable trays will support, without collapse, a 200 lb. (90.7 kg) concentrated load over and above published loads. Published load safety factor is 1.5. To convert 1.5 safety factor to 2.0, multiply the published load by 0.75. To obtain mid-span deflection, multiply a load by the deflection multiplier. Cable tray must be supported on spans shorter than or equal to the length of the cable tray being installed.

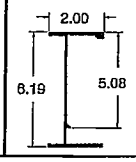
Individual rungs will support without collapse a 200 lb. (90.7 kg) concentrated load applied at the mid-span of the rung, over and above the NEMA rated cable load with a 1.5 safety factor for highlighted NEMA spans and loads. See table on page 367 for rung capacities.

B-Line Series	Side Rail Dimensions	NEMA, CSA & UL Classifications	Span ft	Load lbs/ft	Deflection Multiplier	Design Factors for Two Rails	Span meters	Load kg/m	Deflection Multiplier	Design Factors for Two Rails
26		NEMA: 20A 16B CSA: D1-6m UL Cross-Sectional Area: 1.00 in²	10 12 14 16 18 20	204 142 104 80 63 51	0.0028 0.006 0.011 0.019 0.030 0.045	Area=1.41 in² Sx=2.53 in³ Ix=7.915 in⁴	3.0 3.7 4.3 4.9 5.5 6.1	304 211 155 119 94 76	0.049 0.101 0.186 0.318 0.509 0.776	Area=9.10 cm² Sx=41.46 cm³ Ix=329.45 cm⁴

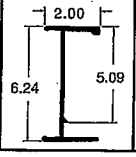
When trays are used in continuous spans, the deflection of the tray is reduced by as much as 50%. Design factors: Ix = Moment of Inertia, Sx = Section Modulus.

B-Line Series	Side Rail Dimensions	NEMA, CSA & UL Classifications	Span ft	Load lbs/ft	Deflection Multiplier	Design Factors for Two Rails	Span meters	Load kg/m	Deflection Multiplier	Design Factors for Two Rails
36		NEMA: 20B 16C CSA: E-6m UL Cross-Sectional Area: 1.50 in²	12 14 16 18 20 22	233 171 131 104 84 69	0.0043 0.008 0.014 0.022 0.033 0.049	Area=1.81 in² Sx=3.36 in³ Ix=10.85 in⁴	3.7 4.3 4.9 5.5 6.1 6.7	347 255 195 154 125 103	0.073 0.136 0.232 0.372 0.566 0.829	Area=11.68 cm² Sx=55.06 cm³ Ix=451.61 cm⁴

When trays are used in continuous spans, the deflection of the tray is reduced by as much as 50%. Design factors: Ix = Moment of Inertia, Sx = Section Modulus.

B-Line Series	Side Rail Dimensions	NEMA, CSA & UL Classifications	Span ft	Load lbs/ft	Deflection Multiplier	Design Factors for Two Rails	Span meters	Load kg/m	Deflection Multiplier	Design Factors for Two Rails
46		NEMA: 20C CSA: E-6m UL Cross-Sectional Area: 1.50 in²	14 16 18 20 22 24	210 161 127 103 85 72	0.0071 0.012 0.019 0.030 0.043 0.061	Area=2.06 in² Sx=3.59 in³ Ix=12.18 in⁴	4.3 4.9 5.5 6.1 6.7 7.3	313 239 189 153 127 106	0.121 0.207 0.331 0.505 0.739 1.046	Area=13.29 cm² Sx=58.88 cm³ Ix=506.97 cm⁴

When trays are used in continuous spans, the deflection of the tray is reduced by as much as 50%. Design factors: Ix = Moment of Inertia, Sx = Section Modulus.

B-Line Series	Side Rail Dimensions	NEMA, CSA & UL Classifications	Span ft	Load lbs/ft	Deflection Multiplier	Design Factors for Two Rails	Span meters	Load kg/m	Deflection Multiplier	Design Factors for Two Rails
H46		NEMA: 20C CSA: 131 kg/m 7.6m UL Cross-Sectional Area: 2.00 in²	16 18 20 22 24 25	261 206 167 138 116 88	0.0085 0.014 0.021 0.030 0.043 0.051	Area=2.95 in² Sx=5.33 in³ Ix=17.30 in⁴	4.9 5.5 6.1 6.7 7.3 7.6	388 307 248 205 173 161	0.145 0.238 0.355 0.520 0.737 0.867	Area=19.08 cm² Sx=87.34 cm³ Ix=720.08 cm⁴

When trays are used in continuous spans, the deflection of the tray is reduced by as much as 50%. Design factors: Ix = Moment of Inertia, Sx = Section Modulus.

Section 1- Acceptable Manufacturers

1.01 Manufacturer: Subject to compliance with these specifications, cable tray systems shall be as manufactured by Cooper B-Line, Inc.

Section 2- Cable Tray Sections and Components

2.01 General: Except as otherwise indicated, provide metal cable trays, of types, classes and sizes indicated; with splice plates, bolts, nuts and washers for connecting units. Construct units with rounded edges and smooth surfaces, in compliance with applicable standards; and with the following additional construction features. Cable tray shall be installed according to the latest revision of NEMA VE 2.

2.02 Materials and Finish: Straight section and fitting side rails and rungs shall be extruded from Aluminum Association Alloy 6063. All fabricated parts shall be made from Aluminum Association Alloy 5052.

2.03 Ladder Cable Trays shall consist of two longitudinal members (side rails) with transverse members (rungs) welded to the side rails. Rungs shall be spaced [6] [9] [12] inches on center. Rung spacing in radiused fittings shall be industry standard 9" and measured at the center of the tray's width. Each rung must be capable of supporting a 200 lb. concentrated load at the center of the cable tray over and above the cable load with a safety factor of 1.5.

2.04 Ventilated Trough Cable Trays shall consist of two longitudinal members (side rails) with a corrugated bottom welded to the side rails or rungs spaced 4" on center. The peaks of the corrugated bottom shall have a minimum flat cable bearing surface of 2 3/4" and shall be spaced on 6" centers. To provide ventilation in the tray, the valleys of the corrugated bottom shall have 2 1/4" x 4" rectangular holes punched along the width of the bottom.

2.05 Non-Ventilated Bottom Trough Cable Trays shall consist of two longitudinal members (side rails) with a corrugated bottom welded to the side rails or a solid sheet over rungs. The peaks of the corrugated bottom shall have a minimum flat cable bearing surface of 2 3/4" and shall be spaced on 6" centers.

2.06 Cable tray loading depth shall be [3] [4] [5] [6] inches per NEMA VE 1.

2.07 Straight sections shall have side rails fabricated as I-beams. Straight sections shall be supplied in standard [12 foot] [24 foot] [10 foot (3 m)] [20 foot (6 m)] lengths.

2.08 Cable tray widths shall be [6] [9] [12] [18] [24] [30] [36] inches or as shown on drawings.

2.09 Splice plates shall be the Wedge-Lock design with 4 nuts and bolts per plate. The resistance of fixed splice connections between an adjacent section of tray shall not exceed 0.00033 ohm.

2.10 All fittings must have a minimum radius of [12] [24] [36] [48] inches.

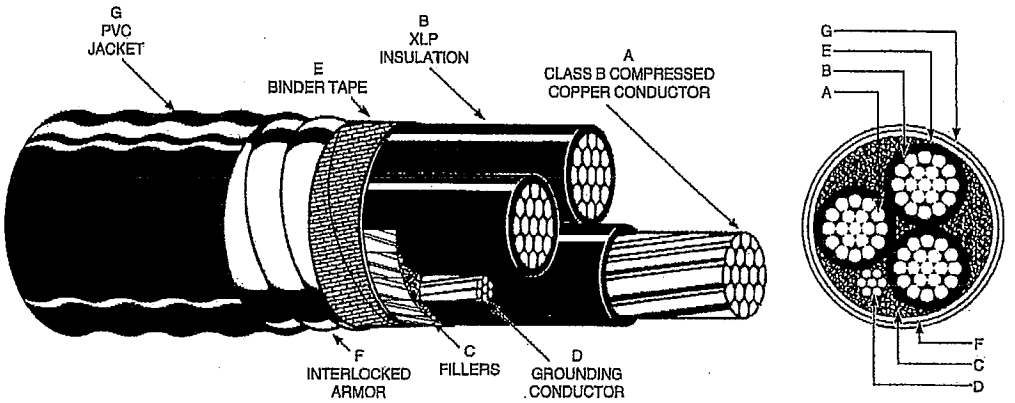
Section 3- Loading Capacities and Testing

3.01 Cable tray shall be capable of carrying a uniformly distributed load of _____ lbs/ft on a _____ ft support span with a safety factor of 1.5 when supported as a simple span and tested per NEMA VE 1 5.2. In addition to the uniformly distributed load the cable tray shall support 200 lbs. concentrated load at mid-point of span. Load and safety factors specified are applicable to both the side rails and rung capacities. Cable tray shall be made to manufacturing tolerances as specified by NEMA.

3.02 Upon request, manufacturer shall provide test reports in accordance with the latest revision of NEMA VE 1 or CSA C22.2 No. 126.

AL01XXH

600V Type MC
Cross-linked Polyethylene (XLP) Insulation
Aluminum Armor. PVC Jacket.



APPLICATIONS

Southwire's 600 Volt Type MC Cable is for use in aerial installations, direct burial, metal racks, cable trays, troughs or continuous rigid cable supports. Listed by Underwriters Laboratories as Type MC, this cable is capable of operating continuously at a maximum conductor temperature of 90° C in wet or dry locations. For use in Class I Div. 2, Class II Div. 2, & Class III Div. 1, hazardous locations.

SPECIFICATIONS

Southwire's 600 Volt Type MC Cable is manufactured and tested in accordance with the latest revisions of:

- UL 44 - Thermoset-Insulated Wires and Cables.
- UL 1569 - Metal-Clad Cables.
- IEEE 1202 - Flame Testing of Cables for Use in Cable Tray in Industrial and Commercial Occupancies (70,000 Btu/hr).
- ICEA T-29-520 - Vertical Cable Tray Flame Tests (210,000 Btu/hr).
- ICEA S-95-658 (NEMA WC 70) construction requirements.

CONSTRUCTION

Southwire's 600 Volt Type MC Cable is rated 90°C wet or dry and is flame and sunlight resistant. It's Heavy Duty construction starts with proven XLP insulated XHHW-2 conductors and a bare copper grounding conductor surrounded with aluminum armor (M/C). The entire assembly is covered with a PVC outer jacket. For use in cable trays per NEC Article 392. CPE and non-halogen jackets are available upon request.

Southwire
One Southwire Drive
Carrollton, Ga. 30119 USA

MADE IN THE USA

AL01XXH 3c, XLPE (XHHW), GW, Alum. Interlocked Armor

Product Code	Size	Conductor Diameter		Insulation Thickness		Insulation Diameter		Gnd.* Cond. Size	Approx. Core Diameter		Armored Diameter		Jacket Thickness		Approx. Overall Diameter		Approximate Net Weight		Allowable Ampacity+
	AWG or kcmil	inch	mm	inch	mm	inch	mm	AWG	inch	mm	inch	mm	inch	mm	inch	mm	lb./Mft.	kg/km	
AL01-XXH-008	8	.139	3.53	.045	1.14	.232	5.9	10	.51	12.9	.72	18.3	.05	1.27	.82	20.8	405	603	59
AL01-XXH-006	6	.174	4.43	.045	1.14	.267	6.79	8	.586	14.9	.796	20.2	.05	1.27	.896	22.7	550	819	79
AL01-XXH-004	4	.221	5.6	.045	1.14	.314	7.96	8	.685	17.4	.895	22.7	.05	1.27	.995	25.3	727	1082	104
AL01-XXH-002	2	.277	7.04	.045	1.14	.37	9.41	6	.808	20.5	1.018	25.9	.05	1.27	1.118	28.4	1048	1560	138
AL01-XXH-001	1	.322	8.18	.055	1.4	.435	11.05	6	.948	24.1	1.158	29.4	.05	1.27	1.258	31.9	1269	1888	161
AL01-XXH-010	1/0	.362	9.19	.055	1.4	.475	12.07	6	1.034	26.3	1.244	31.6	.05	1.27	1.344	34.1	1533	2281	186
AL01-XXH-020	2/0	.405	10.29	.055	1.4	.518	13.16	6	1.127	28.6	1.337	34	.05	1.27	1.437	36.5	1823	2713	215
AL01-XXH-030	3/0	.454	11.53	.055	1.4	.567	14.4	4	1.233	31.3	1.443	36.6	.05	1.27	1.543	39.2	2262	3366	249
AL01-XXH-040	4/0	.51	12.95	.055	1.4	.623	15.82	4	1.354	34.4	1.664	42.3	.06	1.52	1.784	45.3	2814	4187	287
AL01-XXH-250	250	.558	14.17	.065	1.65	.691	17.55	4	1.501	38.1	1.811	46	.06	1.52	1.931	49	3275	4874	320
AL01-XXH-350	350	.661	16.79	.065	1.65	.794	20.17	3	1.723	43.8	2.033	51.6	.06	1.52	2.153	54.7	4396	6542	394
AL01-XXH-500	500	.79	20.07	.065	1.65	.923	23.44	2	2.002	50.8	2.312	58.7	.075	1.91	2.462	62.5	6104	9083	487
AL01-XXH-750	750	.968	24.59	.08	2.03	1.131	28.73	1	2.455	62.4	2.765	70.2	.075	1.91	2.915	74	8860	13184	615

*Three uncoated standard ground conductors may be provided upon request.
+Ampacities are based on Table B.310.3 of the NEC, 2008 edition. Ampacities are for multiconductor cables in free air, 90°C conductor, 40°C ambient temperature, for use as specified in section Annex B and for use in cable trays as specified in section 392-11.
Note: All sizes available as four power conductor construction with two ground wires.

SCOPE: This specification covers three conductor XLP(cross-linked polyethylene) insulated, interlocked armored, thermoplastic jacketed, 600-Volt cable with grounding conductor for use in aerial installations, metal racks, cable trays, troughs or continuous rigid cable supports. This cable is capable of operation continuously at a conductor temperature of 90°C in wet or dry locations.

STANDARDS: The following standards will form part of this specification - ICEA S-95-658/NEMA WC70, UL 44, UL 1569 Type MC.

CONDUCTOR: The conductor will be Class B compressed concentric stranded bare copper in accordance with ASTM B3 and B8 and ICEA.

INSULATION: The insulation will be XLP meeting the requirements of the referenced standards. The insulation thickness will be as listed in ICEA, and the minimum spot thickness will not be less than 90% of the listed amounts. The method of phase identification will be similar to ICEA Method 3 using printed circuit numbers and colors(1-BLACK,2-RED,3-BLUE). UL Listed XHHW-2 conductors are used.

GROUNDING CONDUCTOR: The grounding conductor will be Class B compressed concentric stranded bare copper in accordance with ASTM B3 and B8.

ASSEMBLY: The insulated conductors will be cabled round with fillers and with a grounding conductor in one outer interstice and covered with a binder tape.

ARMOR: A single strip of interlocked aluminum tape will be applied over the assembly.

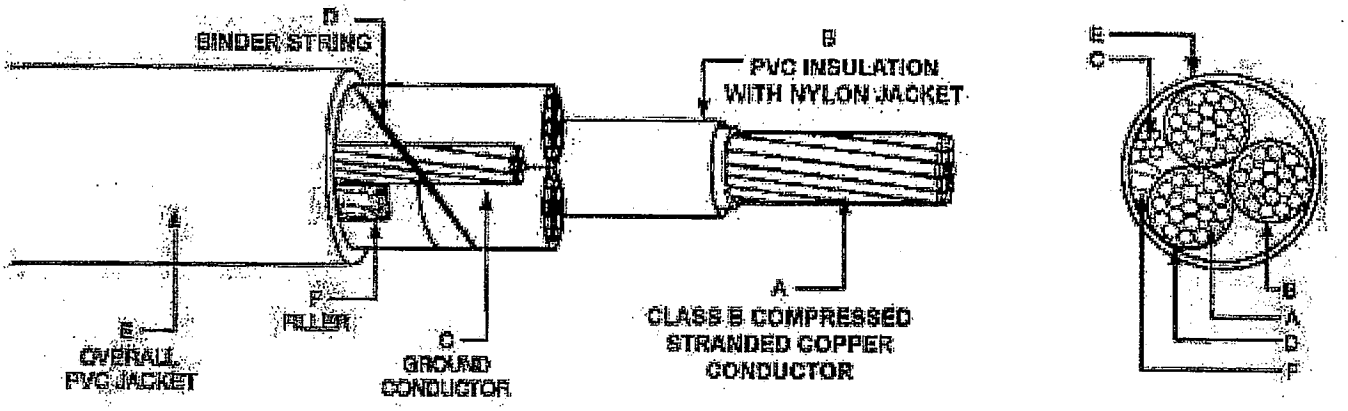
JACKET: The cable will be covered with a black PVC jacket conforming to the requirements specified for polyvinyl chloride in ICEA. The average thickness will be in accordance with ICEA, and the minimum spot thickness will be not less than 80% of the average thickness. The jacket will be sunlight resistant and will meet the requirements of the IEEE 1202 (70,000 Btu/hr) vertical tray flame test and ICEA T-29-520 (210,000 Btu/hr) ribbon burner flame test. Optional CPE and non-halogen jackets are available.

IDENTIFICATION: Manufacturer's identification will be printed on the jacket.

TESTS: Physical and electrical tests will be conducted in accordance with the requirements of the referenced standards.

Type TC Power Cable-THHN

Copper Conductors with PVC/Nylon Insulation Rated THHN.
Heat, Moisture and Sunlight Resistant PVC Outer Jacket.
Type TC Power Cable. 600 Volt.
RoHS



APPLICATIONS

Southwire's Type TC Power Cable is used to supply power to motors, or for connection to other power devices in industrial settings. Primary installations include cable trays, raceways, and outdoor locations where supported by a messenger wire. Type TC Power Cable is listed for direct burial and for use in Class 1, Division 2 hazardous locations and Class 1 control circuits. This cable may be used at temperatures not to exceed 75°C in wet locations and 90°C in dry locations.

SPECIFICATIONS

Southwire's Type TC Power Cable meets or exceeds the applicable requirements of the following standards and specifications:

- ASTM
- UL 1277
- ICEA S-58-679 - Control Cable Conductor Identification. Method 4
- UL 1685 - UL CT Flame Exposure Test (70,000 Btu/hr).
- ICEA T-29-520 - Vertical Cable Tray Flame Test (210,000 Btu/hr).
- IEEE 1202/FT4
- ICEA S-95-658 (NEMA WC 70) construction requirements.

CONSTRUCTION

Southwire's Type TC Power Cable is manufactured using Type THHN or THWN conductors. Individual conductors are bare annealed copper covered with a polyvinyl chloride (PVC) insulation over which a nylon (polyamide) or UL listed equal jacket is applied. The overall jacket consists of a flame retardant, moisture and sunlight resistant PVC jacket. Non-halogen jacket available upon request.

Southwire
One Southwire Drive
Carrollton, Ga. 30119 USA

MADE IN THE USA

greenSpec™
RoHS Compliant

3c, THHN/PVC, GW, Type TC Power Cable

Type TC-Power Cable Three THHN or THWN Conductors With Ground									
Size (AWG or kcmil)	Stranding	Ground Conductor Size (AWG)	Jacket Thickness (inches)	Avg. Overall Diameter		Approximate Weight		Ampacity	
				inches	mm	lbs./1000'	kg./km.	75°C	90°C
8	7	10	.060	.625	15.9	295	440	50	55
6	7	8	.060	.71	18	435	647	65	75
4	7	8	.060	.795	20.2	606	902	85	95
2	7	6	.080	.958	24.3	942	1401	115	130
1	19	6	.080	1.1	27.9	1195	1779	130	150
1/0	19	6	.080	1.184	30.1	1445	2150	150	170
2/0	19	6	.080	1.281	32.5	1734	2579	175	195
3/0	19	4	.080	1.391	35.3	2163	3218	200	225
4/0	19	4	.080	1.508	38.3	2617	3894	230	260
250	37	4	.080	1.659	42.1	3070	4568	255	290
350	37	3	.110	1.942	49.3	4276	6363	310	350
500	37	2	.110	2.22	56.4	5906	8788	380	430
750	61	1	.110	2.652	67.4	8609	12811	475	535

Note: Ampacities are based on Table 310.16 of the NEC, 2008 Editon. Ampacities are for general use with a 90°C conductor and 30°C ambient temperature as specified in section 310.15 and in cable trays as specified in section 392-11.
6 and 8 AWG constructions with insulated grounds (standard) and 4 AWG and larger with bare or insulated ground are UL Listed for exposed runs (ER) per NEC 336.10.

Attachment "A"

CONTRACTOR'S INQUIRY RESPONSES

November 13, 2001

CONTRACT NO. 04-006064
Ben-Mar, I-680/780 Interchange

The responses to contractors' inquiries, unless incorporated into a formal addenda to the contract, are not a part of the contract and are provided for the contractor's convenience only. In some instances, the question and answer may represent a summary of the matters discussed rather than a word-for-word recitation. The responses may be considered along with all other information furnished to prospective bidders for the purpose of bidding on the project. The availability or use of information provided in the responses to contractors' inquiries is not to be construed in any way as a waiver of the provisions of section 2-1.03 of the Standard Specifications or any other provision of the contract, the plans, Standard Specifications or Special Provisions, nor to excuse the contractor from full compliance with those contract requirements. Bidders are cautioned that subsequent responses or contract addenda may affect or vary a response previously given, and any such subsequent response or addenda should be taken into consideration when submitting a bid for the project. Inquiries submitted within seventy-two (72) hours of the bid opening date might not be addressed.

The Caltrans District 4 Office is located at 111 Grand Avenue, Oakland, CA 94612. Send Contractor Inquiries via email to the Duty Senior at **Duty_Senior_District04@dot.ca.gov**. The mailing address is P.O. Box 23660, Oakland, CA 94623-0660. The Duty Senior's telephone number is (510) 286-5209. **All inquiries must include the contract number.**

Total Number of Inquiries:66

Inquiry No.	**Inquiry**/Response
1.0	**Sheet E-171, 420 of 838, thur E-176. There is no scale for these sheets. What is the distance from abut 1 to abut 19 of the existing bridge?** The distance from abutment 1 to abutment 19 of the existing bridge is 6215-feet (1894.3m).
2.0	**What is the elevation difference between the upper catwalk and lower catwalk at pier 3? Same for pier 13.** The elevation between the upper catwalk and lower catwalk at pier 3 and 13 of the existing bridge is about 18.3 meters.
3.0	**How is the cable tray to be installed from the upper catwalk to the lower catwalk at piers 3 and 13?** The cable tray shall be installed in accordance with the manufacturer's recommendation.
4.0	**When will access too contract 04-006034 (abut 1 thur pier 17) and 04-006044 (Toll Plaza) be permitted?** Please see Addendum #1.
5.0	**To complete the electrical work of this contract, depends on the completion of**

State of California Department of Transportation

Attachment "B" (see page 4)

San Francisco – Oakland Bay Bridge
East Span Seismic Safety Project

BIOLOGICAL MONITORING AND MITIGATION COMPLIANCE REPORT FOR AUGUST 2009 (REPORT #86)

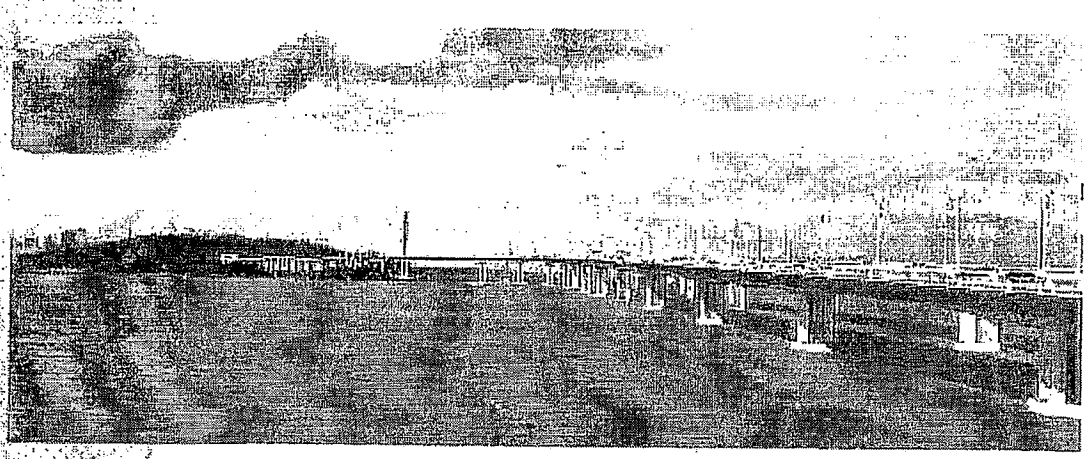
In Accordance with California Department of Fish and Game Incidental Take Permit No. 2081-2001-021-03

October 2009

0120F3, 0120L3, and 0120R3
04-SF-80 KP 12.2/KP 14.3
04-ALA-80 KP 0.0/KP 2.1

San Francisco – Oakland Bay Bridge
East Span Seismic Safety Project

BIOLOGICAL MONITORING AND MITIGATION COMPLIANCE REPORT FOR AUGUST 2009 (REPORT #86)



Prepared by

Justin Mercer
PB

Reviewed by

Ivy Edmonds-Hess
PB

Approved by

Stefan Galvez-Abadia
Environmental Compliance Manager – SFOBB East Span Project
Caltrans District 4

Jeffrey G. Jensen
District Office Chief – Office of Biological Sciences and Permits
Caltrans District 4

Introduction:
The California Department of Transportation (Caltrans) is in the process of replacing the East Span of the San Francisco-Oakland Bay Bridge (SFOBB) with a new bridge immediately to the north of the existing span (see Figure 1). Construction of the SFOBB East Span Seismic Safety Project (SFOBB Project) is a multi-year effort that involves a number of construction activities on land as well as in San Francisco Bay. Per Conditions 3.h and 3.i of California Endangered Species Act Incidental Take Permit No. 2081-2001-021-03 for the SFOBB Project, this compliance report (Report #86) describes activities conducted by Caltrans during the month of August 2009 to meet the following requirements:

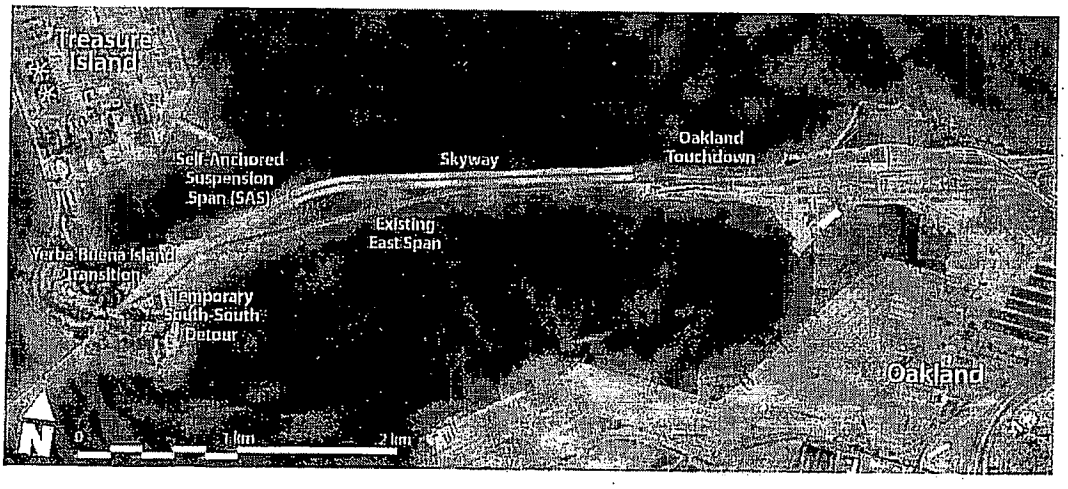
- Condition 3.h - Weekly compliance inspections to "ensure compliance with all measures specified in the permit to avoid the take of the covered species and to minimize and mitigate project impacts on the covered species and other fish and wildlife resources..."; and
- Condition 3.i - A monthly account that "documents Caltrans' compliance with, and effectiveness of, all avoidance, minimization, and mitigation measures, including, but not limited to, the bubble curtain."

The SFOBB Project has four primary components (see Figure 1):

- Oakland Touchdown Structures
- Skyway *(completed 12/2007)*
- Self-Anchored Suspension Span
- Yerba Buena Island Transition Structure

Construction activities to complete these components include, but are not limited to activities such as dredging, excavation, pile-driving, construction of temporary and permanent structures.

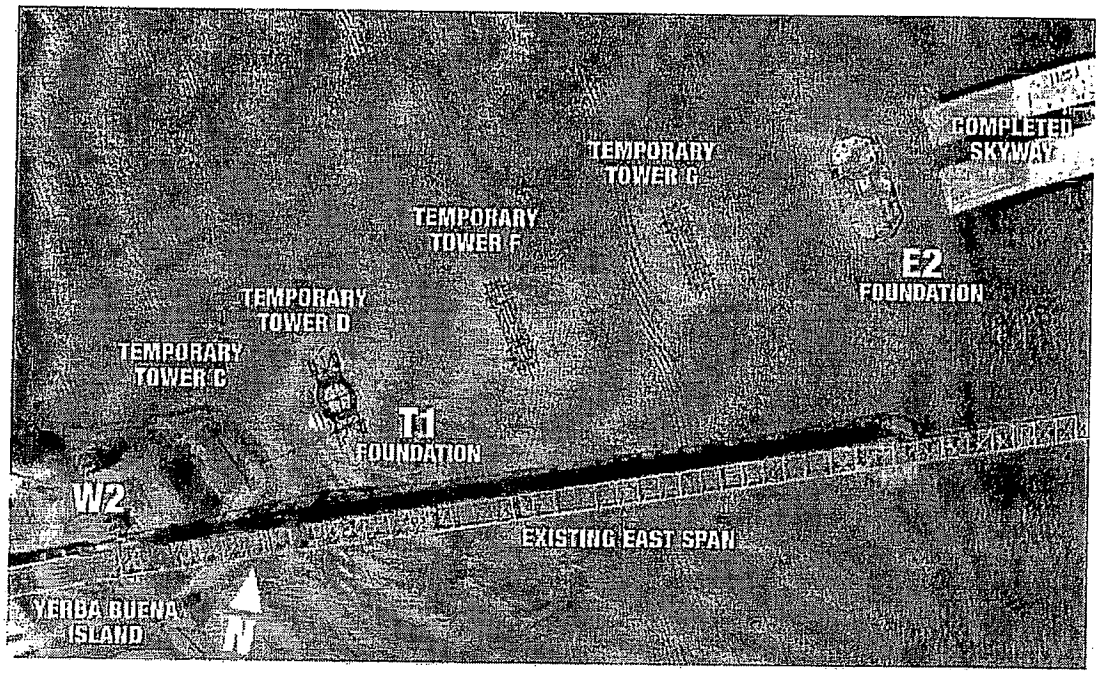
Figure 1. San Francisco-Oakland Bay Bridge Seismic Safety Project Location Map



Project Construction Activities for August 2009:

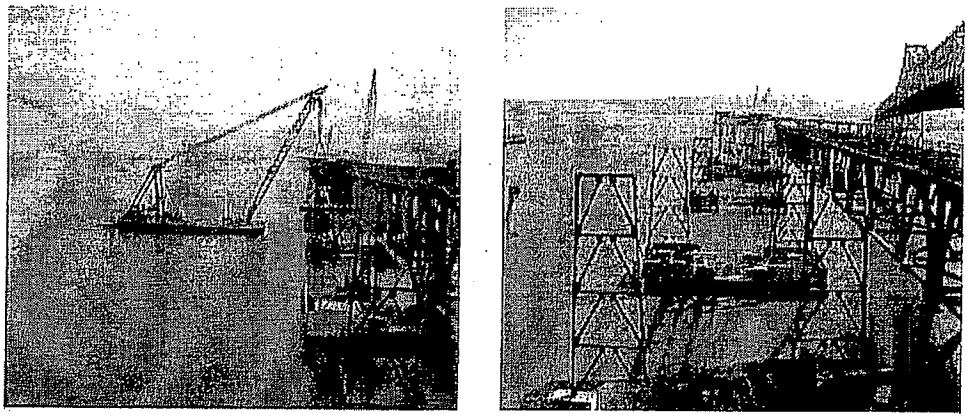
Self-Anchored Suspension Bridge Superstructure Contract
This contract supplies and erects the superstructure of the Self-Anchored Suspension span; the bridge deck, the tower and the cables. Included in this work are the cables at Pier W2 extending vertically between the anchorages in the Pier W2 foundations and the superstructure, the cap beam at Pier W2 and the cross beam at Pier E2 (see Figure 2).

Figure 2. Pier E2, Tower 1 (T1), Pier W2, and Temporary Towers



August work at the Self-Anchored Suspension span construction site consisted of continued work on the falsework deck lowering system and the erection of the Temporary Tower G (see Figure 3). The erection of the temporary truss between Temporary Tower F and Temporary Tower G was completed in mid-August. The Tower 1 (T1) erection Lifts 1 and 2 south and west frames were also completed in China are will be shipped to the job site.

Figure 3. Lifting of Falsework and Temporary Trusses at the Self-Anchored Suspension

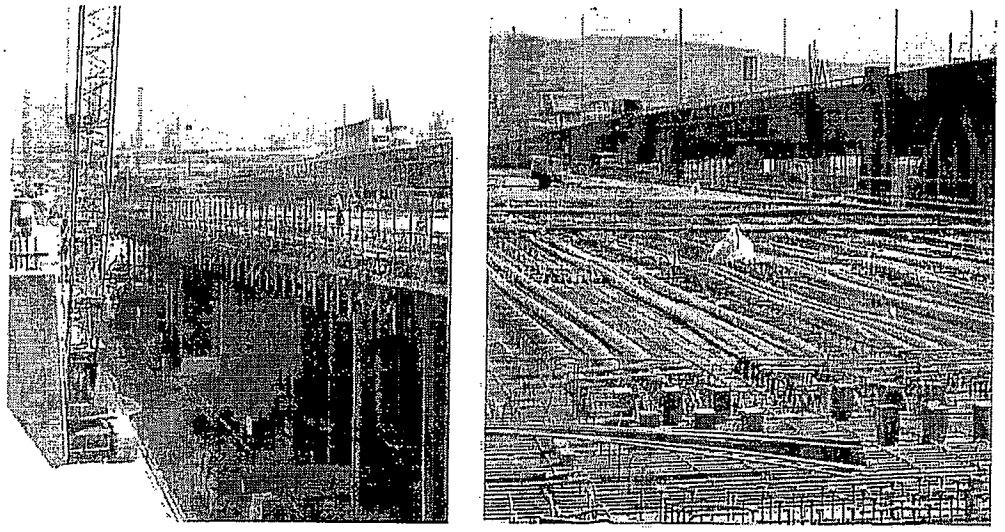


Oakland Touchdown Westbound Structure Contract

This contract constructs the westbound roadway structure at the Oakland Touchdown, a new electrical substation, and extensive relocation of underground utilities. When completed, this section of the bridge (along with an eastbound structure under another contract) will connect the Skyway structure to Interstate 80.

The majority of August construction activity consisted of eastbound structure work. Activities at Piers E17 – E19 included placing deck formwork and deck rebar and preparing for deck concrete placement operations (see Figure 4).

Figure 4. Oakland Touchdown Formwork and Rebar Installation



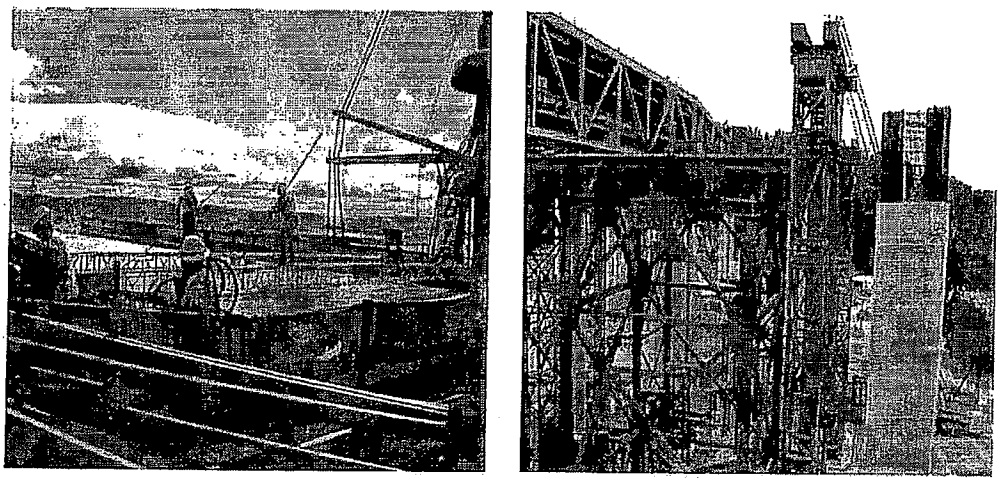
Yerba Buena Island South-South Detour Contract

This contract creates temporary bypass structures that will redirect I-80 traffic around the construction area and completes advance work for the Yerba Buena Island Transition Structure.

During the month of August, the following activities constituted the majority of construction activity:

- On the West Tie-In south-side, work included installation of lower deck drainage, expansion joints, base lifts, and lower and upper deck barrier rails. Deck grinding started mid-August. Electrical system testing for the cable tray, call boxes, and soffit lights was conducted as was surveying of eastbound I-80. Preparations for the scheduled September 3 - 8, 2009 roll-in roll-out operation continue;
- For the viaduct, work included installation of the cable tray, deck lighting, soundproofing, overhead signs, security cameras, and deck barrier rails. Electrical system testing for security cameras, cable tray, call boxes, deck lighting, and overhead signs was conducted. Deck grinding and paving operations were conducted during the last half of the month. Preparations for the scheduled September 3 - 8, 2009 roll-in roll-out operation continue;
- At the East Tie-In, work included deck joint drilling, welding and bolting, installing of the joint seal assembly, falsework and scaffolding removal, concrete pours, and the installation of the skidding system (see Figure 5). Water lines, the monitoring system, and the retrofit platform were installed during the last half of the month. A test lift was conducted at the end of the month in preparation for the roll-in and roll-out operation in September; and
- For the Yerba Buena Island Transition Structure, work included installation of the Pier W7 footing and related activities, Pier W5 shoring piles, and concrete pours.

Figure 5. Concrete Pouring and Skid Rail for Roll-In Roll-Out Operations



Status of Mitigation:

1) To address the requirements of the California Department of Fish and Game (CDFG) Incidental Take Permit, the California least tern, California brown pelican, and the American peregrine falcon are monitored at least weekly during construction. In addition to these fully protected species, the double-crested cormorant and western gull are also monitored as they nest on the SFOBB East Span. These five species of birds could be potentially affected by the project during pile driving, dredging, and other construction activities that are in or adjacent to San Francisco Bay.

   For the August monitoring period, eight California brown pelicans and no California least terns were observed within the survey area. Bird monitoring was conducted on August 5, 11, 19, and 24, 2009.

   Monitoring for the 2009/2010 peregrine falcon nesting season will commence in December 2009.

2) A bubble curtain is used to attenuate underwater sound pressure levels (SPLs) when large piles are driven without cofferdams.

   Pile driving operations were not conducted for during the month of August.

3) Caltrans, CDFG, East Bay Regional Park District, San Francisco Bay Conservation and Development Commission (BCDC), Regional Water Quality Control Board, U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service (USFWS), and National Oceanic Atmospheric Administration – National Marine Fisheries Service (NOAA – Fisheries) met on June 23, 2009 to discuss the future of the Central Bay Mitigation Program. The group reached consensus to approve that Caltrans transfer the remaining mitigation funds to NOAA-Fisheries to perform diversified eelgrass restoration efforts at multiple locations throughout the Bay. Caltrans is working with BCDC and NOAA-Fisheries to pursue this transfer of funds and responsibilities.

Compliance Inspection:

In accordance with the measures specified in Condition 3.h of the Incidental Take Permit, a weekly compliance inspection of the appropriate measures was administered. Caltrans assigned a weekly compliance inspector who corresponded with the monitoring task leaders every Friday of the month. The inspector verified and confirmed with the monitoring task leaders that site visits were conducted as scheduled. In addition, the inspector collected the monitoring data sheets, which detail the observations taken during the site visits. A copy of these survey data sheets is provided in Appendix A of this compliance report.

STATE OF CALIFORNIA

DEPARTMENT OF TRANSPORTATION

NOTICE TO CONTRACTORS

AND

SPECIAL PROVISIONS

FOR CONSTRUCTION ON STATE HIGHWAY IN

SAN FRANCISCO COUNTY IN SAN FRANCISCO

FROM 0.6 KM TO 1.3 KM EAST OF THE YERBA BUENA TUNNEL EAST PORTAL

DISTRICT 04, ROUTE 80

For Use in Connection with Standard Specifications Dated JULY 1999, Standard Plans Dated JULY 1999, and Labor Surcharge and Equipment Rental Rates.

CONTRACT NO. 04-0120F4

04-SF-80-13.2/13.9

*** CONFORMED THROUGH ADDENDUM NO. 7 ***

May 25, 2006 edition

Bids Open: March 22, 2006

Dated: August 1, 2005

OSD

Tray size in mm:	305	610	762
Mass in kg/m:	37.5	75	93.75

Maximum tray support span shall be 4.74 meters.
Maximum conduit support span shall be 3.0 meters.

CABLE TRAY LADDER TYPE

Cable tray systems are defined to include, but are not limited to straight sections of ladder type cable trays, bends, tees, elbows, dropouts, supports and accessories.

Quality Assurance

The Contractor shall furnish to the Engineer a Certificate of Compliance from the manufacturer in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications for each cable tray ladder type. The certificate shall be signed by the manufacturer's quality control representative and shall state that all materials and workmanship comply with the specifications and approved shop plans. The manufacturer shall be a firm regularly engaged in manufacture of cable trays and fittings of types and capacities required, whose products have been in satisfactory use in similar services. The cable tray ladder types shall comply with the following standards NEMA VE1, NEC Article 318, Underwriters Laboratory and NFPA 70B.

Cable Tray Sections and Components

Straight section and fitting side rails and rungs shall be made of ASTM Designation: A 570 and A 611 steel. The cable tray system shall be hot-dip galvanized after fabrication in conformance with the requirements in ASTM Designation: A 123. The cable tray side rails shall be stamped with the manufacturer's name, part number and material type. Transverse members (rungs) or corrugated bottoms shall be welded to the side rails with steel welding wire.

Ladder type trays shall consist of two longitudinal members (side rails) with transverse members (rungs) welded to the side rails. Rungs shall be spaced 229 mm on center. Rung spacing in fittings shall be 229 mm and measured at the center of the tray's width. Rungs shall have a minimum cable-bearing surface radius edge of 25 mm. Each rung must be capable of supporting 91 kg concentrated load above the cable load at the center of the cable tray with a safety factor of 1.5. Tray sizes shall have 127-mm minimum usable load depth or as noted on the plans.

Straight tray sections shall have side rails fabricated as I-beams. Tray widths shall be as shown on plans. Tray fittings shall include all reducers, and vertical and horizontal bends. All fittings must have a minimum radius of 610 mm. Splice plates shall be the bolted type made as indicated below for each tray type. The resistance of fixed splice connections between an adjacent section of tray shall not exceed 330 μΩ. Splice plate construction shall be such that a splice may be located anywhere within the support span without diminishing rated loading capacity of the cable tray. (The splice plate shall be able to support the full load of the tray). Splice plates shall be manufactured of high strength steel. All hardware shall be stainless steel. Cable tray shall be supported at intervals of not more than 4.74 m. All conduit terminating at trays shall provide a continuous cable route by using bushings specifically suited for attaching conduit to the tray rail and for providing ground continuity.

Cable trays shall meet NEMA Class Designations 16B. The cable trays shall be manufactured by B-Line Systems, Chalfant, or other approved manufacturer.

Cable Tray Solid Trough Type

The solid trough type tray shall be the same as ladder type cable tray specified elsewhere in these special provisions except for the following. It shall be a solid bottom trough type tray with two longitudinal members (side rails) with a corrugated bottom welded to the side rails. The peaks of the corrugated bottom shall have a minimum flat cable-bearing surface of 70 mm and shall be spaced on 152-mm centers. The cable trays may be manufactured by B-Line Systems, Chalfant, or other approved manufacturer. Solid bottom trays with covers shall be used for communications and signal wire trays. Tray fittings shall include all reducers, and vertical and horizontal bends. Cable tray shall be supported at intervals of

not more than 4.74 m. All conduit terminating at trays shall provide a continuous cable route by using bushings specifically suited for attaching conduit to the tray rail and for providing ground continuity.

NEMA TYPE 4X WIREWAY

The wireway shall be NEMA Type 4x Continuous Hinge Feed-Through Wireway. It shall be 14-gage Type 304 stainless steel. The seams shall be continuously welded and ground smooth, no holes or knockouts. It shall have 10-gage stainless steel flanges with smooth, rounded edges on all sections and fittings preventing damage to the insulation of the wire. The stainless steel heavy butt hinges and door clamp assembly shall assure a complete seal between covers and bodies. The gasket and adhesive shall be oil-resistant. The solid oil-resistant gasket shall be positioned between flanges when sections and fittings are bolted together. The wireway shall meet the latest edition of the following industry standards NEMA Type

AMGRGN UE

RE: VE proposal comments from Ameren
Ronald G Leible to: Dickneite, Dennis F 02/03/2011 12:31 PM
Cc: "'Ronald.Leible@modot.mo.gov'", Randy C Hitt, Gregory J Horn, John V Grana

Dennis,

Thanks so much for the comments!

Ron Leible, P.E.
MoDOT-Utility Coordinator
(c) 314-744-1662
(e-fax) 636-552-0030

"Dickneite, Dennis F" | Good morning Ron; Sorry for the delay, but w... | 02/03/2011 11:24:23 AM

From: "Dickneite, Dennis F" <DDickneite@ameren.com>
To: "'Ronald.Leible@modot.mo.gov'" <Ronald.Leible@modot.mo.gov>
Date: 02/03/2011 11:24 AM
Subject: RE: VE proposal comments

Good morning Ron;
Sorry for the delay, but we have been "snowed in" for the past two days.

The only issues we have had with our exterior cable trays are the birds and bird droppings. These problems have not provided issues with the cables, so much as with esthetics. Our cable trays have a raised cover on them that makes for a great bird roost. The cables have held up well though. Our electrical engineers recommend a PVC coated cable for external use.

As a side note, our trays are elevated overhead and are not exposed to chemicals for melting snow/ice.

Let me know if you need anything further.

::::::::::::::::::::::::::

dennis dickneite, P.E.
Consulting Design Engineer
Nuclear Engineering Design, Mech/Civil

T 314.225.1797
F 573.676.4334
E ddickneite@ameren.com

.....

Ameren Missouri
Callaway Nuclear Power Plant